

**STRUCTURE AND METHOD FOR FABRICATING SEMICONDUCTOR
STRUCTURES AND DEVICES UTILIZING THE FORMATION OF A
COMPLIANT SUBSTRATE HAVING A NIOBIUM CONCENTRATION**

5

Abstract of the Disclosure

High quality epitaxial layers of monocrystalline materials can be grown
overlying monocrystalline substrates such as large silicon wafers by forming a
10 compliant substrate for growing the monocrystalline layers. The compliant substrate
includes an accommodating buffer layer comprising a layer of monocrystalline oxide
having a niobium concentration that provides for substantial lattice matching of the
accommodating buffer layer to the overlying monocrystalline material layer. The
monocrystalline oxide of the accommodating buffer layer is selected to be lattice
15 matched to the underlying monocrystalline substrate. The accommodating buffer layer
may be spaced apart from the underlying monocrystalline substrate by an amorphous
interface layer. The amorphous interface layer dissipates strain and permits the growth
of a high quality monocrystalline accommodating buffer layer.

20